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PAPER MANUFACTURE IN INDONESIA

- INDONESIA -

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FOREWORD

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PAPER MANUFACTURE IN INDONESIA

[Following is a translation of an article by Anwar Sutan Saidi entitled "Pabrik Kertas" (English version above) in Mimbar Umum (Public Forum), Vol XIV, No 34/35. Djakarta, 23 August 1960, pages 25-28.]

1. The three points of thought in this analysis are:
 - a. The discussion held with Ir. Soedarsono and his companion, a deputy of Ir. Soedarsono, the director of Pusat Perkebunan Negara Baru [Central Office of the New State Estates] in Djakarta, establishes that:
 - I. The acreage of land planted to sugar by P.P.N. Baru amounts to 50,000 hectares.
 - II. The acreage of land planted to sugar by private farmers plus that of Madu Kismo amounts to 26,000 hectares.
 - III. One sugar factory possesses and farms at least 1,000 hectares of sugar.
 - IV. One hectare of sugar yields 100 quintals of sugar cane from which 30 percent sugar pulp can be obtained.
 - V. P.P.N. Baru prefers to use residual oil rather than sugar pulp as a fuel.
 - VI. P.P. N. Baru is willing to sell its sugar pulp at a price of Rp. 0.15 per Kg.

VII. The conversion of sugar pulp burning furnaces into residual oil burning furnaces requires capital amounting to 14 x Rp. 200,000 in foreign currency and Rp. 300,000 in local currency per sugar factory.

VIII. There must be certainty of the availability of residual oil in oil refineries and of transportation of residual oil by ships and railroads from oil refineries to sugar mills.

IX. One Kg of sugar pulp produces 2,000 Calories. One Kg of residual oil produces 10,000 Calories. One Kg of teak wood produces 4,000 Calories.

X. Two sugar factories which had converted their sugar pulp burning furnaces into residual oil burning furnaces have reconverted them to sugar pulp burning furnaces due to the absence of assurance of on-time arrival of residual oil to the sugar factories. The problem, then, is the handicap in transportation.

b. The letter of Boeki Seizo Kabushiki Kaisha, Kobe, Japan, dated 28 April 1960, addressed to P.B. Grafika Nasional Seluruh Indonesia, contains these important items which are relevant to the analysis:

That the "Okunu Pulp & Paper Laboratory" has discovered a new process of manufacturing newsprint from sugar pulp and that the price of a paper factory using sugar pulp as raw material is less than one using wood as raw material.

That the above-mentioned Laboratory has acquired a patent right on the process of strengthening Rayon made from sugar pulp, which has a better quality than Alpha cellulose, a process which has been studied by industries in India and South America.

- c. The cable of Boeki Seizo Kabushiki Kaisha, Japan, addressed to P.B. Grafika Nasional, stated that one paper factory, using sugar pulp, with a capacity of 40 tons of paper daily (24 hours) -- 20 tons of newsprint and 20 tons of HVS typing paper -- will cost US. \$1,890,000 of f.o.b.

2. Paper consumption in Indonesia

- A. It is difficult to obtain an exact figure of paper consumption because the wrapping paper which is hand made from rice straw has not been completely registered and the annual production has never been computed. Nevertheless, the figures for paper imported from abroad and produced in the paper factories of Padalarang and Letjes can serve as a basis for estimating actual consumption.

Figures for 1956 compiled by the Central Bureau for Statistics are:

Paper imported amounts to 111,132,118 Kg and costs Rp. 265,407,756 or equal to US.\$22,226,423.40. For 1956 it would be better to employ a figure of 120 million Kg as a total of imported and domestically produced paper. If the population of Indonesia for that year is estimated at 80 million souls only, then, the consumption per capita was about 1.5 Kg a year.

Whereas, during the year 1959 the import figure declined greatly making total consumption 190 million Kg a year including domestic production, while the total population of Indonesia was estimated at 90 million people. At this rate the consumption per capital is only 1 Kg a year. This figure has been confirmed by the Minister of People's Industry, Ir. Suharto, at the convention of Grafika Nasional held in Tjipajung, Bogor, on April 1960.

- B. How much paper do we actually need? It is also difficult to give exact figures, but the complaints of the public in regard to the paper shortage are familiar to us. Schoolbooks are short; daily newspaper and magazines are limited in their pages; literature for sparetime entertainment is very small in number; wrapping paper for commercial and industrial merchandise is far from adequate. To better understand the paper shortage one can study a booklet entitled "Grafika Nasional Membangun Pabrik Kertas" [the Grafika Nasional is Building Paper Factories].
- C. As a comparison, the annual paper consumption per capita in Japan, approximately 29 Kg, will be considered. Japan is still behind Europe and even more so behind the United States in paper consumption per capita.
3. The target for Indonesia during the coming eight years is 10 Kg a year per capita. If the population of Indonesia is estimated to be 120 million people in 1969, then, in order to achieve the target we must produce 120 million times 10 Kg or 1,200 million Kg paper of all kinds and uses.

With the present production of Pajalarang and Letjes, which is $2 \times 8,000$ Kg per day at the most, annual production is $2 \times 8,000$ Kg \times 300 = 4.8 million Kg only. A shortage of 1,195 million Kg remains and much more has to be produced by ourselves if the target of 10 Kg a year per capita is going to be reached. This amount must be reached by Indonesia in order to accelerate the education program and to provide wrapping paper for products of present and future industries, and what is more important, for Indonesia to catch up with her neighboring advanced countries, such as Japan. Even if Japan retains her annual consumption of 29 Kg per capita in 1969, Indonesia will only be at a level of one third of Japan in regard to the paper industry and consumption.

Nature enables us to reach such a target since sugar pulp as raw material will always be available as long as Indonesia continues producing sugar at the present level.

In 1970, the population of Indonesia will probably reach 120 million souls. Hence, in order to provide sufficient sugar for domestic consumption alone, the sugar plantations must be expanded to yield additional sugar, and the P.P.N. Baru has already drawn up a plan to build new sugar factories and plantations in the following places:

- I. Lombok Barat
- II. Lombok Timur
- III. Lombok Tengah
- IV. Celebes
- V. Atjeh, Sumatra

Each place will have one sugar factory with at least 1,000 hectares of sugar plantations.

By increasing the number of sugar factories the amount of sugar pulp for manufacturing paper will automatically go up. Since the locations of the new sugar plantations and factories will be in areas outside Java, the objective of spreading out industry in the form of sugar and paper factories, will be achieved.

4. What kind of raw material would be the best for the paper factories to be built?

- a) Wood as raw material to manufacture paper has been practiced all over the world.
- b) Rice straw has also been processed and used in the paper factories of Padalarang and Letjes.
- c) Bamboo has been used by paper factories in Burma and other countries.
- d) Sugar pulp as raw material has been used in several sugar producing countries.

- e) Alang-alang [sword] grass has been used in manufacturing paper and a factory of this kind exists in Formosa.

Two years ago the Philippines has conducted a research in using alang-alang [sword] grass, called "Gugon" in Tagalog, and the research has been completed and was successful, although its application in a factory has not yet become a reality.

On Indonesian soil alang-alang [sword] grass grows wild and when the grass is cut it grows again.

- f) Nipa [palm family or mangrove], which also contains cellulose and can be used to manufacture paper, grows abundantly in swamps in Boreno and Sumatra. It grows wild and when the branches are cut to extract cellulose, they will be replaced by new branches and will, therefore, require no replanting.

The acreage of swamps in those two islands covered by Nipa [palm family or mangrove] is approximately 700,000 hectares.

Since all the raw materials mentioned previously grow plentifully in Indonesia, the question is one of deciding the kind of raw material which can be easily obtained; finding out the kind of raw material which requires the least expensive capital investment in terms of foreign as well as local currency; and, finally, choosing the raw material which is most profitable economically.

If pine trees are chosen as the raw material, in spite the fact that the pine trees to be used grow wild in Takengon, Atjeh, and in the vicinity of Lake Toba, it should be considered that the pine trees which are cut down by hand must be replaced to be cut down again after 15 years.

If, therefore, expenses are incurred to cut down the pine trees, expenses will also be incurred to plant new pine trees. Capital investment is not only the price of a factory and other equipment, but also the costs of building roads in the forests. It might also be necessary to build tracks between collecting points and the factory.

If rice straw or paddy stalk is chosen as the raw material, it would be difficult to collect a sufficient quantity such as 50 times the present needs of Padalarang and Letjes.

Although this raw material is not grown for the purpose of manufacturing paper, the price, as a result of collecting and transporting it to the factories, is high. For example, the present price paid by the paper factory in Padalarang is Rp. 0.65 at its lowest and Rp. 0.80 at its highest rate per Kg. If the need becomes five times the annual need of Padalarang, the price will be Rp. 1.00 at its lowest rate because it necessitates collecting at further distances from the factories.

If bamboo is chosen as the raw material, the main problem is the insufficiency of land presently grown with bamboo to fulfill the needs of this project. This type of a project, therefore, requires new cultivation and expansion will run into the problem of land scarcity. The islands outside Java, with their extensive areas, lack the necessary manpower. Bamboo as raw material for paper should not be considered for the coming 20 years. It is true that along-along [sword] grass and nipa [palm family or mangrove] grow wild and abundantly in Indonesia and require no effort for planting. They will continue to grow wild after being cut down. Nevertheless, since we have no experience in converting them into paper, it would be better to preserve them for the future.

Sugar pulp should be chosen as the raw material to manufacture the amount of paper needed. The goal should be not only to stop the importation of paper, but also to provide and produce the projected amount which will enable us to reach the target of 10 Kg per capita for the year 1968.

There are other advantages from using sugar pulp.

- I. Sugar pulp is and will always be available at the sugar mills.
- II. The price of a paper factory using sugar pulp is less than one using wood pulp.

III. The price of sugar pulp of Rp. 0.15 per Kg is less than the price paid by the paper factory in Padalarang for rice straw.

IV. There will be no need to build new roads, as would be the case if wood pulp is used, since means of transportation exist in the sugar plantations. Even railway tracks to the sugar factories are available.

V. There will be no money needed to purchase land upon which to build paper factories because each sugar factory holds some land in reserve.

VI. Buildings in which for storing paper need not be erected because warehouses for storing sugar pulp can be used for storing paper.

VII. The desire of the sugar factories to modernize their furnaces can be fulfilled. At the same time the sugar factories may gain some monetary benefits. This will be covered in another section in this analysis.

5. Some notes:

- a) sugar pulp can be made into any kind of paper; from smooth to coarse paper; from thin to thick paper; from writing paper to printing paper; except:
- b) wrapping paper for cement which has to be manufactured from wood pulp.
- c) Indarung with its production of approximately 150,000 tons a year and Gresik with its production of approximately 250,000 tons a year will both consume $400,000 \times 20 \times 750 \text{ Gram} = 6,000,000 \text{ Kg}$ of cement wrapping paper. Cement factories will be expanded during the coming eight years to about $1\frac{1}{2}$ times the present capacity of Indarung and Gresik and will therefore require $2\frac{1}{2} \times 6,000 \text{ tons} = 15,000$ of tons wrapping paper for cement annually. Therefore, making paper from wood pulp should only be directed toward providing wrapping paper for cement.

6. Some calculations:

aa) sugar pulp:

Acreage of sugar plantations owned by

P.P.N. Baru 50,000 hectares

Acreage of sugar plantations owned by

private farmers 26,000 hectares

Total acreage 76,000 hectares

1 hectare of sugar plantation yields 1,000 quintals of sugar cane. Total of sugar cane is 76,000 quintals.

From sugar cane to sugar pulp is 30 percent.

Total of sugar pulp is 2,280,000,000 Kg.

bb) From sugar pulp to paper pulp it is 70 percent; from paper pulp to paper it is 90 percent; therefore, from sugar pulp to paper it is 63 percent.

cc) 2,280 million Kg sugar pulp can make 63 percent
 $\times 2,280,000,000 \text{ Kg} = 1,436.4 \text{ million Kg}$ or
1,436,400 tons a year.

dd) The paper needs of 120 million people with 10 Kg or 1.2 million tons of paper and if 1,436,400 tons of paper can be manufactured from total sugar pulp, there will be a surplus.

ee) Five Kg of sugar pulp can be sold by the sugar factories to the paper factories at Rp. 0.15 per Kg and will bring Rp. 0.75.

One Kg of residual oil, as a fuel substitute for sugar pulp, can be bought by the sugar factories at Rp. 0.26. This leaves a profit of Rp. 0.49 per five Kg sugar pulp. Thus, through selling one Kg sugar pulp and buying one Kg of residual oil as a fuel substitute, the sugar factories make a profit of Rp. 0.10 per Kg. And the

profit of P.P.N. Baru plus that of Madu Kismo will amount to 2,280 million Kg x Rp. 0.10 which is equal to Rp. 228 million a year.

ff) The costs of one sugar factory to convert sugar pulp burning furnaces into residual oil burning furnaces -- one factory has 14 furnaces -- amount of 14 x Rp. 200,000 in foreign currency = Rp. 2.8 million which is equal to US.\$62,220.00 plus 14 x Rp. 300,000 in local currency which is equal to Rp. 4.2 million 57 factories (see list of names and locations of sugar factories), where furnaces would be converted, require 57 x \$62,222.00 = \$3,546,654.00. The amount of local currency needed would be 57 x Rp. 4.2 million = Rp. 240.4 million. Madu Kismo is not yet included.

gg) Comparison.

(a) The necessary amount of US.\$3,546,654.00 in foreign currency would be equal to the amount spent for the importation of paper for two months of 1956.

(b) The necessary amount of Rp. 240.4 million in local currency would be equal to the profit which would have resulted during a single year from selling sugar pulp by the sugar factories to the paper factories.

7. The prerequisites of the P.P. N. Baru are as follows:

(a.1.) guarantee of shipment of residual oil from oil refineries and its arrival at sugar factories on specified periods.

(b.1.) authorization of budgets to convert sugar pulp burning furnaces into residual oil burning furnaces.

(c.1.) approval and allotment of foreign currency to purchase new machines from abroad.

(d.1.) tankers and railway tank-cars are needed to ship residual oil to sugar factories. The theoretical ratio of five Kg of sugar pulp equal to one Kg of residual oil (sugar pulp with 2,000 Calories per Kg while residual oil has 10,000 Calories per Kg) may in reality turn out to be one to ten, since a certain percentage of sugar pulp will be wasted or not used as fuel. Based on the latter ratio, residual oil that has to be shipped from the oil refinery in Palembang (Tjepu should not be counted upon) amounts to 228,000 tons a year. One tanker measuring 20,000 tons or two tankers measuring 10,000 tons can carry the annual needs for residual oil in 11 voyages. The price of a tanker is $20,000 \times \$250.00$ per ton - \$5 million. One railway tank-car measures 10 tons. In a year 22,800 tank-cars would be needed. If there are 300 workdays in a year, the daily need would be 76 tank-cars. Probably this number of tank-cars is already at the disposal of the State Railways.

8. A paper factory can be built on the premises of each existing sugar factory. A sugar factory possessing 1,000 hectares of sugar plantations will harvest $1,000 \times 1,000$ quintals = 100 million Kg of sugar cane, 30 percent of which, after processing, will become sugar pulp or equal to 30 million Kg of sugar pulp.

If 70 percent of the sugar pulp will become paper pulp, 21,000,000 Kg of paper pulp a year will be produced. If 90 percent of the paper pulp will become paper, 18,900,000 Kg of paper will be produced in a year. If a paper factory runs 300 days a year, the capacity of one paper factory will be 60,000 Kg or 60 tons a day (24 hours). Based on the proposal of Boeki Seizo K.K. which quoted f.o.b. \$1,890,000 on one unit with a capacity of 40 tons per 24 hours, including a generator, a unit with a capacity of 60 tons per 24 hours would cost one and one-half times \$1,890,000 or \$2,835,000.00

Machines of greater capacity and purchases of larger quantities might lower the price of 2.5 million.

In order to process the total amount of sugar pulp produced by the existing sugar factories and to provide 10 Kg paper per capita in 1968, 76 of paper factories are needed.

9. Capital investment in eight years.

	<u>US Dollars</u>	<u>Rupiahs</u>
76 units @ 2,600,000	190,000,000	--
Tankers	5,000,000	--
Railway tank cars	P.M.	--
P.P.W. Baru	3,546,654	239,400,000
Construction of factories, housing for employees, transportation vehicles, etc. @ Rp. 25,000,000 a unit fac- tory. 76 units factories: 76 x Rp. 25,000,000		1,900,000,000
Working capital @ Rp. 15,000,000 @ a unit: 76 x Rp. 15,000,000		1,140,000,000
Total	198,546,654	3,279,400,000
Reserve fund	1,453,346	220,600,000
Grand total (rounded)	\$200,000,000	Rp. 3,500,000,000

10. Working schedule to reach production.

<u>Year</u>	<u>Factory installed</u>	<u>Prod. in tons</u>	<u>Net profit Rp. 0.10 @ Kg</u>
1961	--	--	--

1962	2	--	--
1963	6	36,000	360,000,000
1964	10	144,000	1,440,000,000
1965	12	424,000	4,240,000,000
1966	14	548,000	5,480,000,000
1967	16	792,000	7,920,000,000
1968	16	1,080,000	10,800,000,000
1969	--	1,368,000	13,680,000,000

11. Purchase of machines.

Quotations should be requested from two or three foreign countries. It will, firstly, secure competition among suppliers, secondly, assure procurement of highest quality, and thirdly, provide for an agreement that they (suppliers) guarantee operation of the machines and production for three years.

The installment of machines should at the beginning, be ventured in the smallest possible size so that Indonesian workers may be acquainted with the details of the machines to facilitate repairing broken parts after the supplier has left Indonesia.

Appendix

Locations and names of sugar factories to which paper factories will be annexed.

A. Situbondo:

- | | |
|-----------------|----------------|
| 1. Assem Bagoes | 7. Semboro |
| 2. Pandji | 8. Gunung Sari |
| 3. Olean | |
| 4. Wringin Anom | |
| 5. Pradjikan | |
| 6. De Mass | |

B. Purbolinggo:

- 9. Padjarakan
- 10. Gending
- 11. Djatiroto
- 12. Wonolangan

C. Pasuruan:

- 13. Keduwung
- 14. Kebon Agung
- 15. Krebet

D. Sidoarjo:

- 16. Tjandi
- 17. Krian
- 18. Watutulis
- 19. Tulungan
- 20. Krembung

E. Modjokerto:

- 21. Gempol Krep

F. Djombang:

- 22. Tjoekir
- 23. Djombang

G. Kediri:

- 24. Ngadiredjo
- 25. Pesantren
- 26. Maritjon

H. Ngandjuk Madiun:

- 27. Modjo panggung
- 28. Lestarie
- 29. Redjoagung
- 30. Kenigora
- 31. Pagottan
- 32. Redjosarie
- 33. Purwodadi
- 34. Sudhoro

I. Surakarta:

- 35. Medja
- 36. Tasikmadoe
- 37. Tjolomadoe
- 38. Gondang-Winangun

J. Djogjakarta:

- 39. Padokan
- 39a. Madu Kismo

K. Banjumas:

- 40. Kalibgor

L. Kudus:

- 41. Pakkies
- 42. Trangkil
- 43. Rendeng
- 44. Tjepiring

M. Pekalongan:

- 45. Sragi
- 46. Tjemal
- 47. Sumberhardjo

N. Tegal:

- 48. Pangka
- 49. Djatibarang
- 50. Bandjaratma
- 51. Ketanggungan-West

O. Tjirebon:

- 52. Nieuw-Tersana
- 53. Karang Suwarni
- 54. Sindang Laut
- 55. Gempol
- 56. Djati Wangi
- 57. Kadipaten

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